BOSTON & MAINE RAILROAD, BERLIN BRANCH BRIDGE #143.06
(Snyder Brook Bridge)
Spanning Snyder Brook at former Boston & Maine Railroad (now Presidential Range Rail Trail), just south of U.S. Route 2
Randolph
Coos County
New Hampshire

HAER NH-49
HAER NH-49

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

BOSTON & MAINE RAILROAD, BERLIN BRANCH BRIDGE #143.06[1]
(Snyder Brook Bridge[2])

HAER No. NH-49

Location: Spanning Snyder Brook at former Boston & Maine Railroad (now Presidential Range Rail Trail), just south of U.S. Route 2, approximately 1000' east of the Appalachia Trailhead at Mount Adams, Randolph, Coos County, New Hampshire

Coordinates: The Snyder Brook Bridge is located at latitude: 44.37126, longitude: -71.28517. This coordinate represents the center of the bridge. This coordinate was obtained on November 21, 2011, using Google Maps imagery. The Snyder Brook Bridge has no restriction on its release to the public.

Structural Type: Howe pony truss

Construction Date: 1918

Builder: Boston & Maine Railroad (lessee)

Original Owner: Concord & Montreal Railroad (lessor)

Present Owner: New Hampshire Bureau of Trails

Original Use: Railroad bridge

Present Use: Recreational trail bridge

Significance: Snyder Brook Bridge is one of eight boxed pony truss bridges remaining in North America. This former rail line contributed to the economic development of Coos County and the growth of tourism in the White Mountains.

Historian: Lola Bennett, 2009

Project Information: The National Covered Bridges Recording Project was undertaken by the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Heritage Documentation

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[1] Names found in Boston & Maine Railroad Engineering Department, Bridge List—New Hampshire Division, 1945, 42.

[2] For the sake of simplicity, the structure is referred to in this report as "Snyder Brook Bridge."

Programs (Richard O'Connor, Chief), a division of the National Park Service, U.S. Department of the Interior. The Federal Highway Administration's National Historic Covered Bridge Preservation Program funded the project.

Christopher H. Marston, HAER Architect, served as project leader. Jet Lowe, HAER Photographer, produced the large-format photographs.

Related Documentation: Boston & Maine Railroad, Berlin Branch Bridge #148.81 (Moose Brook Bridge), HAER No. NH-48

CHRONOLOGY

1803 Coos County formed

1805 America's first covered bridge erected at Philadelphia

1830 America's first covered railroad bridge erected for Baltimore & Ohio Railroad

1835 Boston & Maine Railroad chartered by the Massachusetts Legislature

1840 William Howe (1803-1852) patents Howe truss

1844 Boston, Concord & Montreal Railroad (BC&MRR) chartered

1848 White Mountains Railroad chartered

1889 BC&MRR merges with Concord Railroad to form the Concord & Montreal Railroad (RR)

1891 Concord & Montreal RR begins construction of line from Whitefield to Berlin, New Hampshire

1893 Concord & Montreal RR completes line from Whitefield to Berlin

1895 Boston & Maine Railroad (B&MRR) leases Concord & Montreal Railroad for ninety-one years

1917 B&MRR begins upgrading structures on Berlin Branch

1918 Snyder Brook Bridge completed

1968 Congress passes National Trails System Act

1983 Guilford Transportation acquires Boston & Maine Railroad

1986 Rails-to-Trails Conservancy founded at Washington, DC

1989 New Hampshire & Vermont Railroad acquires B&MRR Berlin Branch

1996 New Hampshire & Vermont Railroad abandons B&MRR Berlin Branch

1997 Railroad tracks removed between Jefferson and Berlin

1998 Federal Highway Administration launches National Historic Covered Bridge Preservation Program

1999 State of New Hampshire develops Presidential Range Rail Trail

2009 Historic American Engineering Record documents Snyder Brook Bridge

BOXED PONY TRUSS BRIDGES

While not as picturesque as traditional covered bridges, boxed pony trusses are a product of the same era and building traditions. Low trusses, or "pony" trusses, are an economical way to build short-span bridges. Because of their height, pony truss bridges do not have overhead bracing and, when built of wood, need to be housed differently than full-height timber bridges to allow for the passage of vehicles. The most common solution was to cover each truss separately, leaving the deck uncovered. No one knows how many wooden pony truss bridges once existed, but there are presently only eight known survivors in North America:

WG #	HAER #	BRIDGE	COUNTY	STATE	DATE	TYPE	BUILDER
07-04-01		COMSTOCK	MIDDLESEX	CT	1873	HOWE	UNKNOWN
29-04-P1	NH-48	MOOSE BROOK	COOS	NH	1918	HOWE	B&MRR
29-04-P2	NH-49	SNYDER BROOK	COOS	NH	1918	HOWE	B&MRR
29-06-P1	NH-43	LIVERMORE	HILLSBOROUGH	NH	c1850s	TOWN	UNKNOWN
29-09-P1	NH-44	ROLLINS FARM	STRAFFORD	NH	1929	HOWE	B&MRR
38-09-P1	PA-623	BURNT MILL	BUCKS	PA	c1870s	HOWE	UNKNOWN
61-02-P1		EUGENE DE CHAZEL	ABITIBI-QUEST	QU	c1949	TOWN	DEPT. OF COLONIZATION
61-02-P11		PONT DE LA TRAVERSE	ABITIBI-QUEST	QU	c1949	TOWN	DEPT. OF COLONIZATION

DESCRIPTION

Snyder Brook Bridge is a single-span wood and iron Howe pony truss bridge on stone masonry abutments. The structure is 12'-8" high, 19'-6" wide and 36'-0" long. Though shorter, it is very similar to the Moose Brook Bridge (HAER No. NH-48), both built by the Boston & Maine Railroad.

Each truss has four panels. The top chords are paired 8" x 16" timbers bolted together with spacer blocks. The bottom chords are the same as the top chords. The top and bottom chords are connected by vertical cast-iron tension rods that graduate in diameter from 2-$^1/_2$" at center to 3" at the ends. The truss uses paired 8" x 8" diagonal braces and single 4" x 8" counterbraces in the middle panels. At the end panel the braces are 8" x 10" with a 3" x 6" counterbrace. The diagonal braces are seated on cast-iron thrust blocks keyed to the bottom chords (at all five panel points) and top chords (three middle panel points). There are a total of four 4" x 8" wooden end posts. Twenty-inch-wide timber thrust blocks support an inner set of 4" x 8" end posts at the end panel of the top chords. An outer set of wooden posts at the outer end of the chords is used for nailing siding. The vertical rods pass through the cast-iron shoes and between the top and bottom chord members and are of graduated dimensions. They are fastened above the top chord

and below the bottom chord with a 1'-5-$^{1}/_{8}$" square plate, a 1'-2" square plate, a 5-$^{3}/_{4}$" washer and a 3-$^{1}/_{4}$" square nut.[3]

The floor system is composed of paired 10" x 16" transverse floor beams that hang below the bottom chord and were originally spaced approximately 24" apart. Some newer replacement Douglas fir floor beams measure 12" x 16". There are four lines of 8" x 10" stringers laid longitudinally on top of the floor beams and 6" x 8" x 9' railroad ties laid transversely on top of the stringers. Iron rails, spaced 4'-8-$^{1}/_{2}$" apart, were fastened longitudinally on the ties. The rails and ties were removed in 1997 and replaced with a wood deck.

There are lateral ties, consisting of 1-$^{1}/_{4}$"-diameter rods with turnbuckles, between the bottom chords at each portal. Sway bracing consists of two 12" x 16" timber outriggers that span the full width of the bridge, extending 6'-6" beyond the outer faces of the bottom chords with 1" iron tension rods fastened from the top chord to the outer end of the outriggers.

Each truss is covered with 1" x 6" vertical plank siding. There are plywood access panels at each panel point along the inside of the bridge.

DESIGN

During the 1830s and 1840s, demand increased for standardized bridges that could be rapidly erected and easily maintained to keep pace with the growth of the nation's railroad network.

In 1838, Massachusetts millwright William Howe (1803-1852) built the first Howe truss bridge for the Western Railroad at Warren, Massachusetts.[4] Howe's timber truss design had parallel top and bottom chords connected by wood diagonals (compression members) and iron verticals (tension members). First to incorporate iron for primary structural members, the Howe truss improved on the 1830 Long truss by replacing the vertical posts with adjustable wrought-iron rods to overcome the inherent difficulty of creating tension connections in wood structures and allowing for easier and more efficient pre-stressing of the members. In 1840, Howe received a patent for his truss design.

Howe sold patent rights to companies nationwide and the Howe truss soon became the most widely used wood truss for railroad bridges. Railroads favored the Howe truss design because it could be erected quickly and adjusted easily. An article in the 1878 *Transactions of the American Society of Civil Engineers* stated, "The Howe truss may justly be termed the most perfect wooden bridge ever built; others have been designed of greater theoretical economy; but for simplicity of construction, rapidity of erection, and general utility it stands without rival."[5]

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[3] Additional measurements supplied by Tim Andrews, in correspondence with Christopher Marston, 28 November 2011.

[4] The Quaboag River Bridge was replaced in 1873 with a larger Howe truss covered bridge capable of carrying double tracks.

[5] "Bridge Superstructure," *Transactions of the American Society of Civil Engineers* (1878), 340.

Used extensively for railroad bridges in the United States and Europe during the mid-nineteenth century, the timber Howe truss gradually gave way to similar structures with cast-iron compression members and wrought-iron tension members. There are well over 100 timber Howe truss covered bridges surviving in the United States, although only six of that number are railroad bridges.

HISTORY

In 1891-93, the Concord & Montreal Railroad built a 30-mile, single-track branch line from its main line at Whitefield, New Hampshire, to Berlin, where lumber and paper industries were booming.[6] The line passed through the towns of Jefferson, Randolph and Gorham, along the northern edge of the Presidential Range. Shortly after the line's completion, the Boston & Maine Railroad leased the branch for ninety-one years.

No information has been found concerning the first bridge at this location, but presumably it was a wood structure. World War I brought the need for longer, heavier, and faster freight loads on this division and much of the line was upgraded to accommodate heavier rolling stock. At least three Howe pony truss bridges were built on the line in 1918[7]:

C&MRR #	B&MRR #	TOWN	BRIDGE	TYPE	SPAN	NOTES
254	143.06	RANDOLPH	SNYDER BROOK	HOWE PONY TRUSS	28'-9"	
255	144.13	RANDOLPH	BUMPUS BROOK	HOWE PONY TRUSS	27'-4"	BURNED 1964
262	148.81	GORHAM	MOOSE BROOK	HOWE PONY TRUSS	39'-6"	BURNED 2004

The line saw regular use for both passenger and freight trains until the 1960s. The line was leased to Guilford in 1983 and to New Hampshire & Vermont Railroad in 1989. In 1996, the corridor from Waumbek Junction to Berlin was abandoned, and the New Hampshire Division of Parks and Recreation (Department of Resources and Economic Development) purchased and converted it for a multiple-use recreational trail.[8]

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[6] Concord & Montreal Railroad, *Second Annual Report of the Directors*, June 30, 1891 (Concord: New Hampshire Democratic Press Co., 1891), 14.

[7] It is possible that there were other pony truss bridges on this line, but records have not been found for the entire line.

[8] See http://www.nhstateparks.org/explore/bureau-of-trails/presidential-recreational-trail.aspx, last accessed 6 October 2011. The section of track from Whitefield to Waumbek Junction is still used by the New Hampshire Central Railroad.

BUILDER

Some of the earliest railroad bridges were timber structures because wood was abundant, cheap, and easy to work with. In 1830, Lewis Wernwag built the first wooden railroad bridge in the United States for the Baltimore & Ohio Railroad over the Monocacy River in Maryland. Within a short time, wood bridges were commonplace on America's growing network of railroads. Hundreds of covered railroad bridges were built in the nineteenth century. In 1841, one English traveler noted: "The timber bridges of America are justly celebrated for their magnitude and strength. By their means the railways of America have spread widely and extended rapidly."[9]

By the late nineteenth century, most railroad bridges were being built of iron or steel. The Boston & Maine Railroad was an exception. The company continued to build timber bridges into the early twentieth century. This was largely due to the efforts of Jonathan Parker Snow (1848-1933), an advocate of timber bridges, who served as an engineer for the Boston & Maine Railroad from 1888 to 1911.[10]

Early in his railroad work, Snow became convinced that wooden truss bridges should be maintained in service as long as possible, instead of being replaced with iron trusses. In 1895, nearly 70 percent of the bridges on the Boston & Maine Railroad were wood. The company accepted that the wood bridges might have a shorter service life but believed they could be easily reinforced if necessary. Furthermore, the wood bridges gave ample evidence of distress long before failure. Snow advocated use of the Town lattice truss for long spans and the Howe truss for spans of 30' to 60'.[11] By 1932, the increased weight of rolling stock had led to the replacement of most wooden railroad bridges with metal truss bridges.[12]

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[9] Richard Sanders Allen, *Covered Bridges of the Northeast* (Brattleboro, VT: Stephen Greene Press, 1957), 94.
[10] See HAER No. NH-35, Wright's Bridge.
[11] J.P. Snow, "Wooden Bridge Construction on the Boston & Maine Railroad," *Journal of the Association of Engineering Societies* (July 1895), 35.
[12] Robert Fletcher and J.P. Snow, "A History of the Development of Wooden Bridges," *Proceedings of the American Society of Civil Engineers*, November 1932.

ILLUSTRATED APPENDIX

Image 1. Interior view and side view of wood thrust block and counter brace found in upper end panel of Snyder Brook Bridge. This connection detail was lost in the fire of the nearly identical Moose Brook Bridge (HAER NH-48). Photos by Will Truax, September 2010.

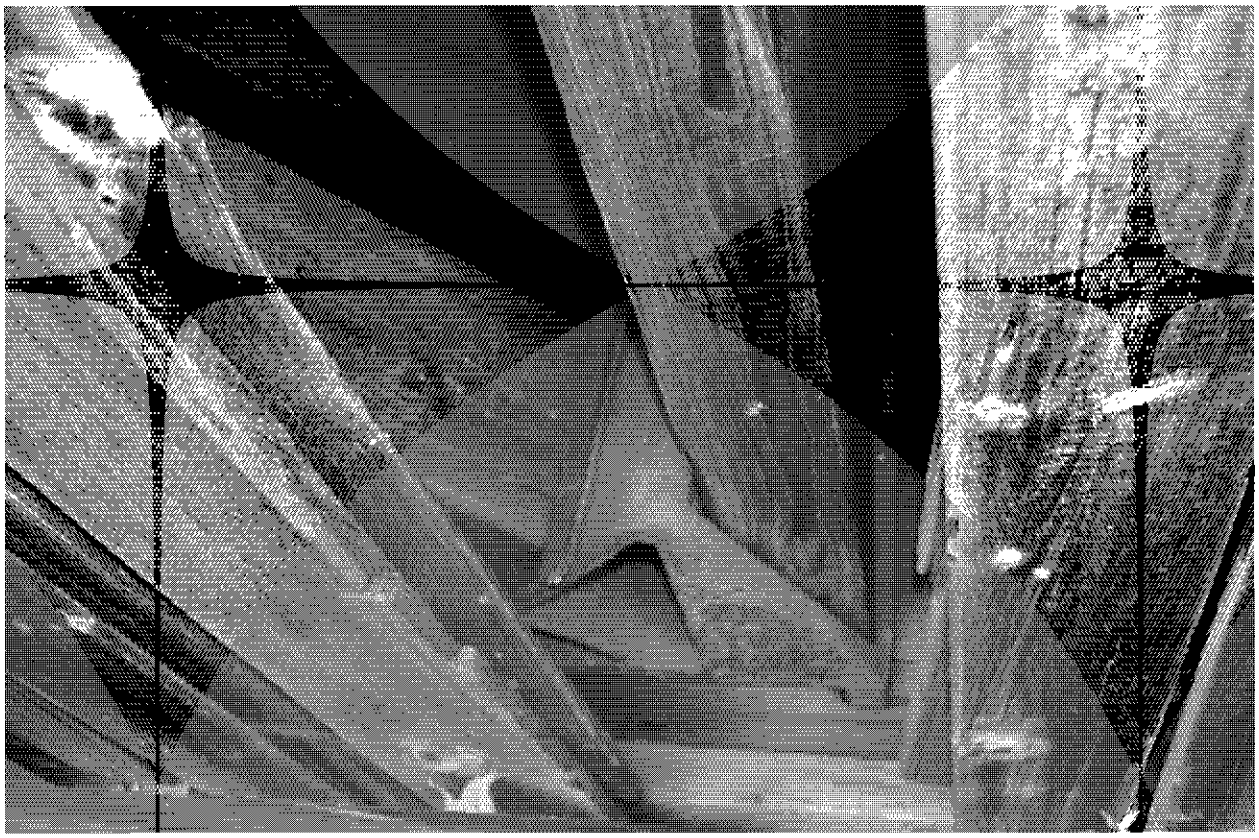

Image 2. Interior view of cast-iron end thrust block and paired braces found in lower end panel of Snyder Brook Bridge. This connection detail matches that on the Moose Brook Bridge. Photo by Christopher Marston, June 2009.

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